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Earth Surface Dynamics Discussions
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Interactive comment on "Multiple controls on sediment grain properties of Peruvian coastal river basins" *by* Camille Litty et al.

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Dear authors,

Thank you for submitting your work to Earth Surface Dynamics Discussions. Two reviewers assessed the manuscript and you have had an opportunity to respond to their comments. Here I summarise my recommendations and provide additional feedback on the author reply and proposed revisions. Following my own assessment, I found myself in full agreement with both reviewers. They noted that the overall idea behind the manuscript is interesting, as is the general study area. The geographical extent of the dataset is also a strength. Indeed, there are outstanding questions regarding the controls on the spatial distributions of grain size in fluvial systems, with Allen et al., (2017), Basin Research, recently highlighting a need for grain size properties to be

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documented across a wider range of climatic, topographic and tectonic settings. There is recognition from the reviewers that there are interesting insights to be gained from this dataset.

However, the reviewers raised substantial issues which need to be addressed before publication. I agree with both reviewers that the manuscript needs to be much clearer in the introduction and discussion, and at present large parts are somewhat unconvincing and confusing. The comments from the reviewers offer a way to do this. Based on my own assessment and the reviewer's comments, the most pressing issues to resolve during revision are:

1. Clearer explanation and presentation on i) the processes which govern grain size distribution in river gravel bars; and ii) how these processes interact in this dataset to explain the observed patterns. The paper should to make clear what is known from the literature in the introduction, and then work these themes through the results and discussion in a systematic way. They key will be to better demonstrate the way in which they combine in this setting. Both reviewers press on this, and have specific recommendations to help here.

2. A more robust analysis of the data and consideration of its limitations (see more detailed comments by both reviewers). These include a clearer explanation of sampling sites and how comparable these are between locations, uncertainties on grain size percentiles and some explanation on the method validation.

Thank you for your reply to the reviewers, which has commented on these main points, and shows that a revised version could address the reviewers concerns and thus be suitable for publication at ESurf. When working towards a revision, please clearly reply to the main comments I mention above, and specifically explain how they have been addressed.

Other comments on the author reply which can be considered while making the revisions:

- I note you mention an addition of a paragraph on how tectonics can influence grain size and properties. It would be useful if the text here also included more in depth discussion on the role of fluvial transport (including abrasion) and the climatic factors (discharge, discharge intensity) that could influence. The reply doesn't indicate this has been included.

- There were some comments in the reply to Reviewer 1 which were unclear, mainly about the role of transience. They seemed to suggest there was additional downstream data than that presented – which if the case should be included. Nevertheless, this comment needs to be dealt with in the revision.

- Figure 3 is a good idea to provide an overview of the site characteristics and the data. However, the inclusion of data from an 'in review' publication is somewhat problematic. That secondary data seems to now be an important part of the discussion. It needs to be referred to without compromising ethics of submission, but if it is not published data the methods and approaches need to be explained herein.

- Table 3 – This is a Pearson correlation matrix, and I guess that significance is $P<0.05$? It is good practice to provide P values for each r value (beneath). Note that the reply mentioned 'state of the art' statistical techniques. This is a standard technique, albeit a helpful one in this context to reveal some of the patterns.

- The graphical representation of the data is important in the community which reads ESurf. I recommend that relationships between some of the key variables are still presented as scatter plots in the revised version.

- Please be more specific when explaining how specific comments have been addressed (replies to Reviewer 2). It is not that helpful to simply state comments have been addressed when the reviewer has raised a specific point which can be discussion in more detail in your reply.

- 'Contrariwise' is not a common word, and may not be clear to non-native (and indeed

native English speakers). It is used on several occasions (i.e. it is overused). Other options include 'In contrast. . ., 'On the other hand. . .'

- Please format replies so that the reviewer's text can be distinguished from the authors reply. I'm aware that the format of the text is the same on the ESurf system, so perhaps use "R1: . . ." and 'Reply: . . ."

Other comments on the original version (not covered by the reviewers comments):

The main conclusions drawn from findings are not very clear in the abstract.

240: language here needs to be more precise with regard to the statistical nature of the relationships.

241: 'frequency'

246: it wasn't clear how glacial melt plays a role here.

247: for floods, runoff magnitude (e.g. peak water discharge) and intensity are important parameters – these need to be teased apart and discussed. Are there any hydrological data or precipitation data which can be analysed from the study are to back these claims up?

252 and 326: 'worse' => 'less'

273: reference needed to support inference of fractures.

279 – clarify what mechanism - do you mean differential abrasion rates controlled by rock type – if so explain and cite relevant work.

288 and 289: 'correlation' => 'association'

Figure 3 – horizontal lines are not needed here (same on other figures). Ensure '50', '84' and '96' are subscript.

Figure 3 B and Figure 6 B– what is the shaded area? Its not necessary.

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